

The genus *Dicopomorpha* (Hymenoptera, Mymaridae) in Africa and a key to *Alaptus*-group genera

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Abstract

Dicopomorpha zebra Huber, **sp. n.** (Hymenoptera, Mymaridae) is described as the first species of *Dicopomorpha* (Ogloblin) from the Afrotropical region, and diversity in the genus is discussed. *Kubja* Subba Rao is placed in synonymy under *Dicopus* Enock, **syn. n.**, and its type species transferred to *Dicopus* as *D. longipes* (Subba Rao), **comb. n.** A key to the *Alaptus*-group of genera (*Alaptus*, *Dicopomorpha*, *Dicopus*, *Kikiki*, and *Mimalaptus*) is presented.

Keywords

Mymaridae, *Dicopomorpha*, *Alaptus*, *Dicopus*, *Kikiki*, *Mimalaptus*, *Dicopomorpha zebra*; taxonomy

Introduction

Ogloblin (1955) described *Dicopomorpha* together with three other new genera, *Calodicopus*, *Chromodicopus*, and *Dicopulus*, from Argentina. The latter two names were synonymized under *Dicopomorpha* by Yoshimoto (1990). Noyes and Valentine (1989) assigned an undescribed species from New Zealand to *Dicopomorpha*, which represented the first published record for the genus in the Australasian region. Triapitsyn and Berezovskiy (2003) noted that the generic limits of *Dicopomorpha* needed redefinition

based on a worldwide study, described a new species from South Korea, and provided a key to the two known eastern Palearctic species, one of which had been transferred to *Dicopomorpha* from *Alaptus* Westwood by Triapitsyn and Huber (2000). Triapitsyn and Berezovskiy (2004) transferred another species to *Dicopomorpha* from *Litus* Hali-day and suggested it represents a distinct and diverse species-group of *Dicopomorpha* in the Australasian and eastern Palearctic regions. *Dicopomorpha* was also reported from the Nearctic region by Huber (1997) and Mockford (1997) so that the genus has been recorded from all continents except Africa.

Huber and Lin (1999) included *Dicopomorpha* in their newly defined *Alaptus*-group of genera along with *Alaptus*, *Dicopus* Enock, *Kubja* Subba Rao, and *Mimalaptus* Noyes & Valentine. Lin et al. (2007) also included five genera in an expanded definition of the *Alaptus*-group that excluded *Kubja* but included *Kikiki* Huber & Beardsley. Here I describe a new species of *Dicopomorpha* from the Afrotropical region, making the genus almost worldwide in distribution, and present a key to the *Alaptus*-group of genera.

I dedicate this contribution to that intrepid collector of small parasitic wasps, Lubomír Masner. His over 50 years of passion and single mindedness in collecting far and wide using as many techniques as possible, some very novel, has resulted in a greater understanding of the diversity and abundance of many groups of Hymenoptera. The resulting collections made by him and others are invaluable for appreciating the tremendous diversity of small parasitic wasps, which permits much better understanding and resolution of genera than if only small scattered collections were available for study.

Methods

Specimens of the new *Dicopomorpha* sp. were critical point dried and card or point mounted. Two specimens were slide mounted for detailed study. Measurements are given in micrometres. Specimens are deposited in the Natural History Museum, London, UK (BMNH) and the Canadian National Collection of Insects, Ottawa, Canada (CNC). Photographs were taken with a ProgRes C14^{plus} digital camera attached to a Nikon Eclipse E800 compound microscope, and the resulting layers combined electronically using Auto-Montage[®] and retouched as needed with Adobe[®] Photoshop CS3[®]. Abbreviations used in the description are: fl_x for funicle segment and gt_x for gastral tergum.

Alaptus group of genera

The *Alaptus*-group of genera is distinguished by at least one apomorphy: in both sexes the anterior scutellum is separated from the posterior scutellum by a transverse suture that sometimes divides the scutellum into two completely separate sclerites (Figs 3, 8, 14). Huber and Lin (1999) and Lin et al. (2007) give additional diagnostic

features. Taking into consideration the changes in classification proposed here, the *Alaptus* group now contains the following five genera: *Alaptus*, *Dicopomorpha*, *Dicopus*, *Kikiki*, and *Mimalaptus*.

Mimalaptus, illustrated here by *M. victoria* (Girault) (Figs 7–11) [on a slide with another mymarid species (Fig. 7)], resembles *Dicopomorpha* in having a 7-segmented (rarely 6-segmented) funicle in females (Figs 9, 11), but differs by the posterior scutellum being clearly divided medially by a longitudinal suture (Fig. 8) and the posterior margin of the fore wing having a distinct lobe behind the venation (Fig. 10). *Mimalaptus* is currently known only from the Australian region (Noyes and Valentine 1989, Lin et al. 2007) but I have seen specimens from the several countries in the Oriental region and Japan (Honshu) in the Palearctic region. Once the fauna is better known it may be better to treat *Mimalaptus* as a subgenus of *Dicopomorpha* because the structure of the posterior scutellum appears to be the only unequivocal difference that separates it from *Dicopomorpha*. I have also seen a fossil specimen from Baltic amber (together with a second, larger, piece of amber in box G 3.910 Hymenoptera #BST03124, Geological-Palaeontological Institute and Museum, Göttingen, Germany), indicating that it is or was much more widespread.

Dicopus is also a worldwide genus that resembles *Dicopomorpha* in having a 7-segmented funicle in females, but is distinguished from it and *Mimalaptus* by an extremely narrow fore wing and ventrally directed mandibles that do not cross over when closed. Several workers had independently recognized that *Kubja* is probably a synonym of *Dicopus* but this was never published. The wings (Fig. 19), mandibles (Figs 13, 15), female antenna (Fig. 16), male antenna (Fig. 17), and general body shape and structure of the mesosoma (Figs 12, 14, 15) of the type specimens (2 females and 1 male, Fig. 18) of *Kubja longipes* Subba Rao are the same as for species of *Dicopus* so the synonymy is formalized here as *Kubja*, syn. n. and the type species is transferred to *Dicopus* as *Dicopus longipes* (Subba Rao), comb. n.

While progress has been made in working out generic limits within the *Alaptus* group of genera, whose members are small even for Mymaridae, there is still uncertainty about generic limits. Further study of as many undescribed species, of *Dicopomorpha* and *Alaptus* in particular, is needed to determine if the current concepts and generic limits represent monophyletic lineages worthy of generic status.

Key to *Alaptus* group of genera. Females.

- 1 Tarsi 3- or 4-segmented; funicle 4- or 5-segmented; clava 2-segmented; mandible with 4 teeth.....***Kikiki***
- Tarsi 5-segmented; funicle at least 5-segmented; clava 1-segmented; mandible with 2 teeth.....**2**
- 2(1) Funicle 5-segmented or rarely with a minute additional segment; fore wing hind margin with a distinct, often recurved, notch behind venation and thereafter almost straight to apex***Alaptus***

- Funicle usually with 6 or 7 distinct segments (Figs 5, 9, 11, 16) but one Australian species of *Dicopus* with 5 segments; fore wing without a distinct notch on hind margin except one species of *Dicopomorpha* from New Zealand (Noyes and Valentine 1989) and hind margin either concave along much of length or only distally **3**
- 3(2) Head in anterior view with mandibles projecting ventrally, not crossed when closed (Figs 13, 15); mandible with one long and one short tooth; fore wing extremely narrow (Figs 12, 19)..... ***Dicopus***
- Head in anterior view with mandibles crossed medially when closed (Figs 4, 9); mandible with two subequal teeth; fore wing wider (Figs 1, 6, 10) **4**
- 4(3) Posterior scutellum entire (Figs 3, 14) ***Dicopomorpha***
- Posterior scutellum divided medially by a longitudinal suture (Fig. 8).....
..... ***Mimalaptus***

***Dicopomorpha* Ogloblin**

Type species. *D. macrocephala* Ogloblin.

Diagnosis. Female antenna 7-segmented; mandibles with 2 subequal teeth and crossed when closed; fore wing progressively widening beyond venation, slightly curved apically, and with very few microtrichia on membrane, posterior scutellum (=frenum) entire.

List and distribution of described *Dicopomorpha* species [original genus in brackets].

D. echmepterygis Mockford, USA.

D. koreana S. Triapitsyn & Berezovskiy, South Korea.

D. liaoningensis (Lou, Cao & Lou) [*Alaptus*], China.

D. macrocephala Ogloblin, Argentina.

D. maximus (Girault) [*Eomymar*], Australia.

D. pulchricornis (Ogloblin) [*Chromodicopus*], Argentina.

D. schleideni (Girault) [*Litus*], Australia.

D. stramineus (Ogloblin) [*Dicopulus*], Argentina.

D. victoria (Girault) [*Dicopus*], Australia.

D. zebra Huber, sp. n., equatorial West Africa.

***Dicopomorpha zebra* Huber, sp. n.**

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Type material. Holotype female (BMNH) on slide (Fig. 2) labelled: 1. “Nigeria: Oyo, Ibadan, IITA compound, XI.1987, J.S. Noyes, Malaise trap”. 2. “*Dicopomorpha zebra* Huber ♀ dorsal Holotype”. Paratypes: 11 females, 1 male (BMNH, CNC). GABON: 15–25 km N. Libreville, Forêt de la Mondah, 25 and 26.XI–3.XII.1987, J.S. Noyes (3

females). IVORY COAST: Lamto, ca. 160 km NW Abijan, 5°02'W 6°13'N, XI.1988, J.S. Noyes, XI.1988 (6 females) and 17.VII.1988 (1 female). NIGERIA: **Oyo**, Ibadan, IITA compound, XI.1987, J.S. Noyes (1 female, 1 male).

Diagnosis. The scape with two distinct, transverse, white bands and the pedicel white, contrasting with the brown flagellum (Figs 1, 5) distinguish this species from other (mostly undescribed) *Dicopomorpha* species.

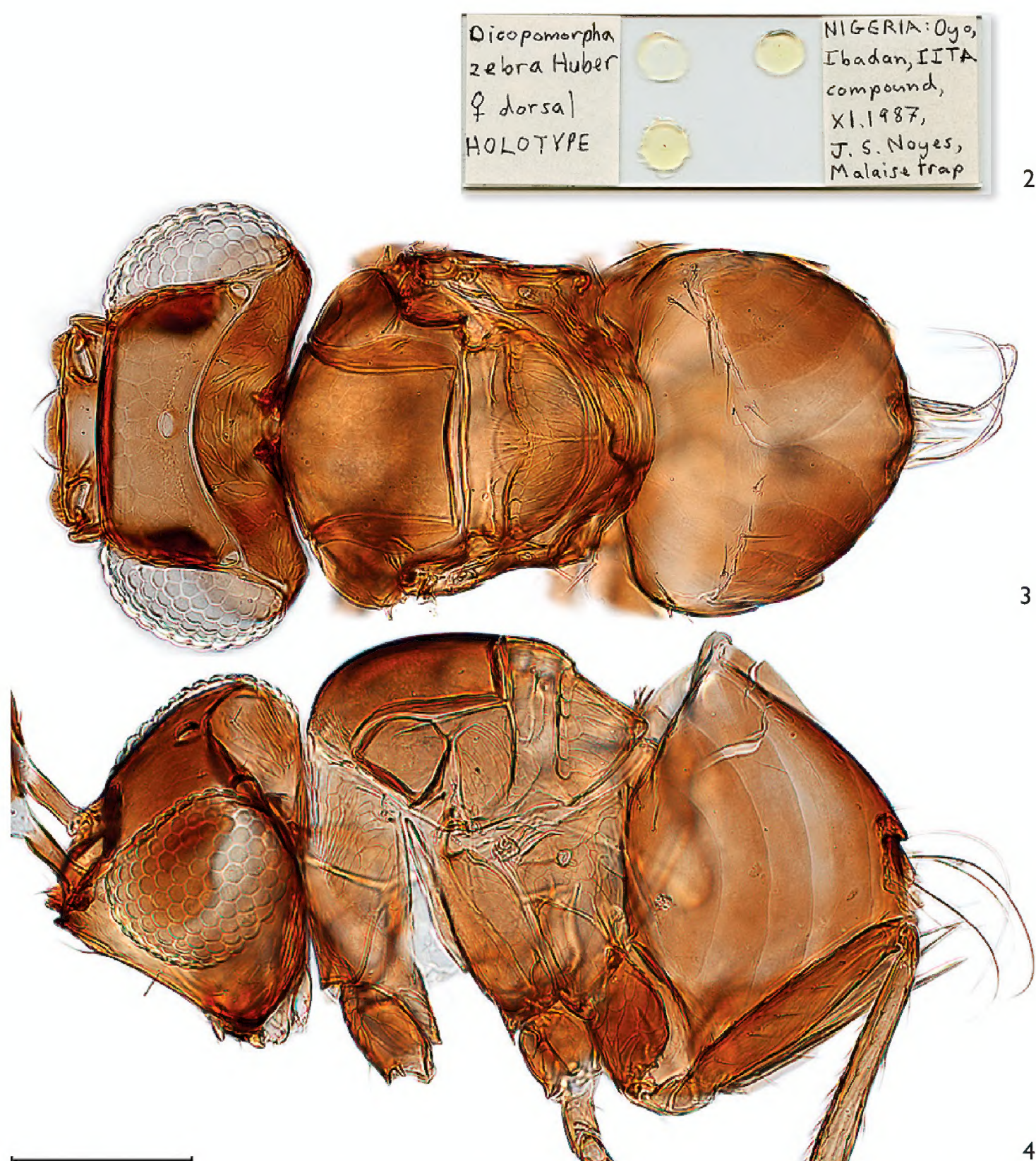
Description. Female. Body length 285–585 (n = 8, critical point dried specimens). Body (Fig. 1) shiny dark brown dorsally, with a faint but distinct mother-of-pearl (blue and green) sheen, especially on vertex and dorsum of mesosoma; head below eyes and between toruli yellowish; gaster lighter ventrally; coxae, trochanters, and parts of femora and tarsi lighter, almost white; scape with two transverse white bands; pedicel white.

Head (Figs 3, 4). Head width $1.4 \times$ length, and length about $1.0 \times$ height. Sculpture generally reticulate but shallow on face and gena, very faint on polished vertex (Fig. 3). Face in lateral view (Fig. 4) strongly angular and produced forward of anterior



Figure 1. *Dicopomorpha zebra* Huber, paratype female, habitus. Scale = 0.1 mm.

margin of eye, with a slightly undulating, sharp-edged junction separating a short, almost horizontal dorsal surface (bearing the toruli) from a strongly receding ventral surface. Vertex (Fig. 3) slightly curving to transverse trabecula anteriorly, its posterior margin concave and forming a sharp angle with occiput; median ocellus about its own diameter from posterior margin of vertex, lateral ocelli at posterolateral corners of vertex. Eye large, extending posteriorly to occiput in dorsal third, separated ventrally from occiput by increasingly widened gena; malar space slightly less than half eye height, with 2 setae. Face with 2 setae on dorsal surface between toruli, 2 setae on ventral

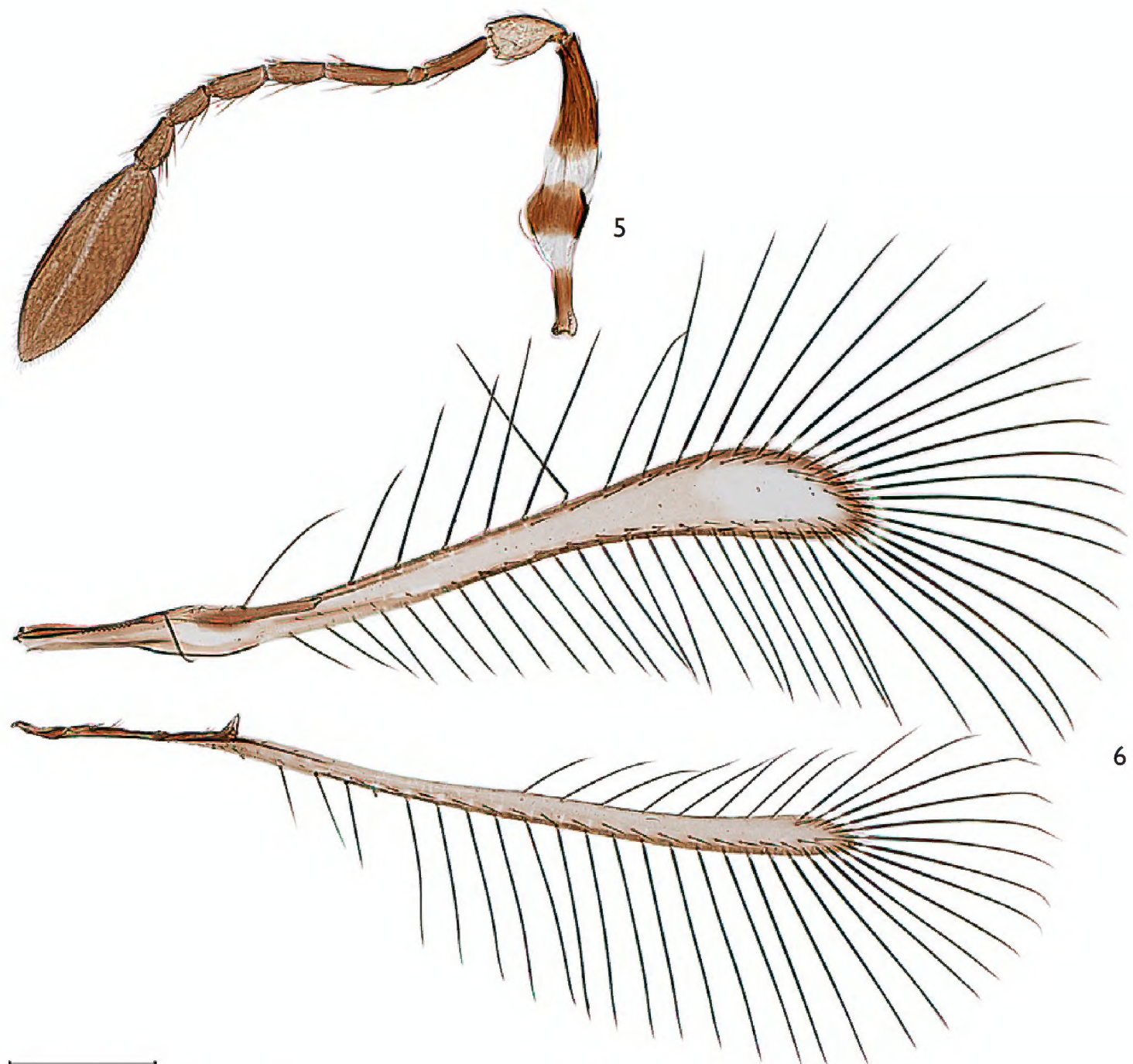


Figures 2–4. *Dicopomorpha zebra* **2** holotype slide, actual size **3** holotype female, body, dorsal **4** paratype female, body, lateral. Scale = 0.1 mm.

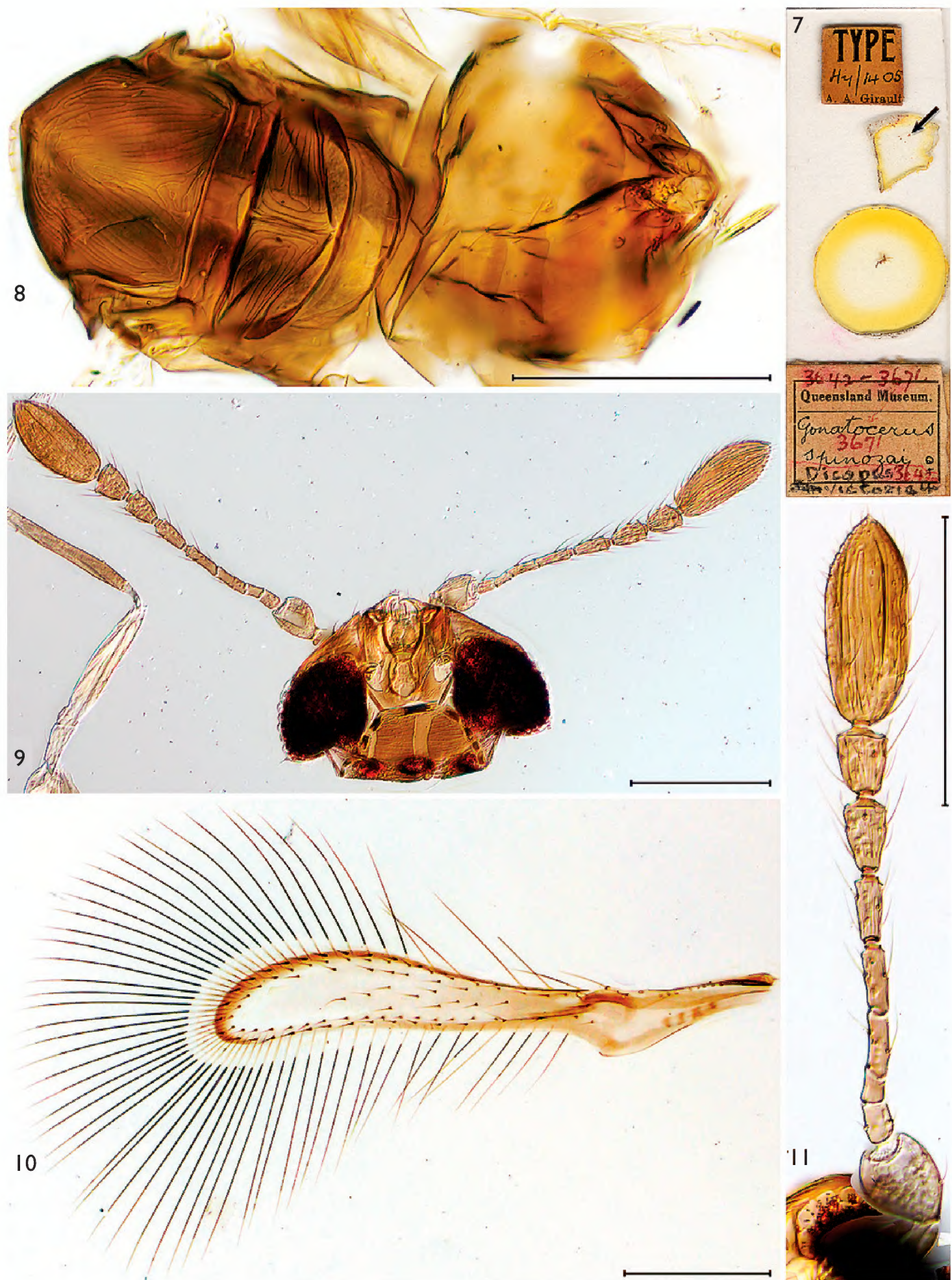
surface sublaterally just below junction with dorsal surface, and about 5 setae laterally along margin with eye and malar space; vertex with 2 minute setae behind median ocellus and 1 longer seta next to each lateral ocellus; occiput with 1 submedian dorsal setae just ventral to junction with vertex.

Antenna (Fig. 5). Scape usually with a prominent bulge ventrally in basal third beyond radicle, then narrowing to apex; radicle not separated from scape by a groove; pedicel almost 2x as long as wide; funicle 7-segmented; fl_2 quadrate, much shorter than remaining funicle segments, in particular fl_1 and fl_3 ; clava as long as fl_4 – fl_7 and fairly wide. Measurements (length/width) of antennal segments (holotype): scape 206/47, pedicel 51/30, fl_1 50/11, fl_2 11/11, fl_3 57/14, fl_4 40/15, fl_5 43/17, fl_6 34/15, fl_7 37/19, clava 154/55. Clava with 3 longitudinal sensilla.

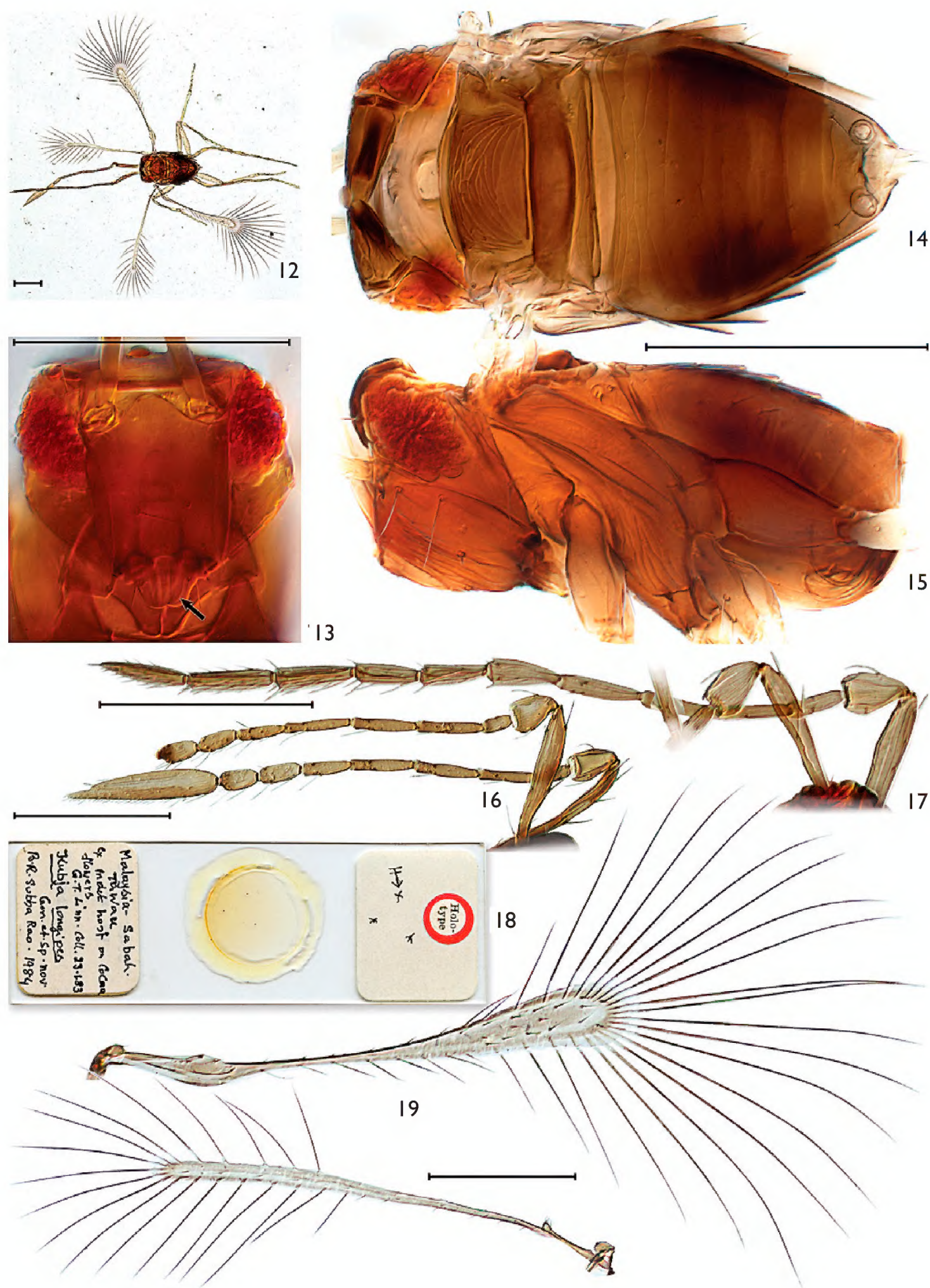
Mesosoma (Figs 1, 3, 4). Length slightly greater than width, with sculpture very faint, at most moderately visible on posterior scutellum (Fig. 3); most setae minute, barely visible. Pronotum extremely short and almost membranous medially, not visible



Figures 5–6. *Dicopomorpha zebra*, holotype **5** antenna **6** wings. Scale = 0.1 mm.



Figures 7–11. *Mimalaptus victoria* (Girault) **7** holotype slide, actual size (together with holotype of *Gonatocerus spinozai* Girault; arrow indicates holotype of *M. victoria*) **8** holotype mesosoma + metasoma, dorsal **9** head, anterior + antennae (specimen on slide 2 in Dahms, 1986: 633) **10** fore wing (same specimen as Fig. 9). **11** holotype, antenna. Scale = 0.1 mm.



Figures 12–19. *Dicopus longipes* (Subba Rao), holotype (except as noted) **12** body, habitus **13** head, anterior (arrow indicates mandible) **14** body, dorsal **15** body, lateral (paratype, female) **16** antennae (paratype, female) **17** antenna (paratype, male) **18** holotype slide, actual size **19** wings (right forewing + left hindwing). Scale = 0.1 mm.

in dorsal view (Fig. 3); mesoscutum shiny (Fig. 3), with very faint sculpture, the lateral lobe prominent with 1 seta at lateral angle, and midlobe with 1 seta medially and 1 seta posteriorly near notaulus; axilla with 2 setae medially and posteriorly; anterior scutellum slightly longer than posterior scutellum medially, but shorter laterally, with the placoid sensilla widely separated and 1 seta just lateral to each sensillum; dorsellum short, about one-third length of posterior scutellum; propodeum short, slightly more than half length of posterior scutellum, the propodeal seta less than two spiracle diameters from spiracle.

Wings (Fig. 6). Fore wing with brown suffusion except behind base of marginal vein and an oval clear area beyond venation in apical quarter, disc without microtrichia except for the usual two rows along anterior and posterior margins. Hypochaeta near apex of submarginal vein; proximal macrochaeta absent, distal macrochaeta at apex of marginal vein at point where vein thins as stigmal vein. Hind wing with uniform brown suffusion, the membrane slightly and gradually widening towards rounded apex, with 1 row of microtrichia along hind margin. Fore wing length (holotype) 573, width 60, longest marginal setae 199, venation length 200. Hind wing length 569, width 19, longest marginal setae 154, venation length 150.

Legs. Normal, with 5 tarsomeres.

Metasoma (Figs 3, 4). Slightly shorter than mesosoma, in dorsal view almost globular but with a distinctly sloping anterior face separated by a sharp ridge from postero-dorsal face; the terga in dorsal view (Fig. 3) strongly oblique, arranged in a V-shaped pattern and except for gt_7 appearing divided medially; with about 12 setae (2 on each of gt_2 – gt_6 , apparently) along the sharp ridge; cercal setae long (about 255) and curved; spiracle apparently absent. Ovipositor 345, equal in length to metatibia.

Male. Body length 426 ($n=1$, critical point dried). Body brown except gaster light brown and base of scape white. Antennal length 1064, 2.5 times length of entire body, apparently with 9 flagellar segments; each flagellomere about $5 \times$ as long as wide; fl_4 length 100.

Variation. Three of the paratypes from Lamto have the scape narrower basally and the white bands less distinct (Fig. 1) than in the other types.

Derivation of species name. Named after the mammal; a noun in apposition referring to the distinctively striped scape of the female antenna.

Discussion. Initially, I considered that *D. zebra* represented a new genus related to *Dicopomorpha* because the funicle is 7-segmented in females and the 2-toothed mandibles cross over when closed, but it exhibits several features that appeared to be very different from other species classified in the genus: 1) the body, especially the vertex and mesosoma, with a faint but distinct mother-of-pearl sheen and scarcely any visible sculpture or setae, 2) the head in lateral view strongly angular, the face distinctly projecting forward in front of eyes, 3) the fore wing distinctly curved, with the hind margin concave distally and with almost no microtrichia on disc except along margins, and 4) the short, almost globular metasoma with strongly oblique, V-shaped terga. However, study of a diversity of mostly undescribed species from five continents failed to yield a single feature could be used to distinguish

unequivocally my proposed genus. One or more of the features listed above occur in one or more other species that clearly belong to *Dicopomorpha*. Indeed, it was not even worth segregating *D. zebra* into a new subgenus, though it might be worth treating it as a representative of a species group defined by the relatively wide and apically curved fore wing. The generic synonymy in the species list above already suggested not only that *Dicopomorpha* is morphologically diverse but also showed that it was easily confused with related genera. To propose yet more genera would begin (again) a trend to oversplit *Dicopomorpha*, which could result in the unfortunate situation of more and more finely divided genera whose limits could not be determined with certainty.

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